CLASSROOM USES FOR
OAIP MATHEMATICS

OAIP

ONTARIO
ASSESSMENT
INSTRUMENT
POOL

Classroom Uses for OAIP Mathematics

Ministry of Education
Ontario

Hon. Bette Stephenson, M.D., Minister
Harry K. Fisher, Deputy Minister

Classroom Uses for OAIP Mathematics

This pamphlet is intended to help teachers of Grades 7 through 10 use OAIP mathematics materials for instruction or assessment. It was prepared by the following individuals:

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Two sets of OAIP materials are now available: the Intermediate Mathematics and the Report of the 1981 Field Trials in English and Mathematics. The Mathematics Pool, published in 1980, contains assessment materials dealing with aspects of numerical methods, algebra, and measurement. Assessment materials for other parts of the mathematics program as set out in the 1980 Intermediate Division Mathematics Guideline will be developed in the future.

The Field Trial Report contains charts showing provincial performance of pupils in Grades 7 through 10, based on approximately 600 instruments (questions) used in the field trials conducted in May 1981. The report also contains a brief interpretation of the results.

To make the best use of the Mathematics Pool and the Field Trial Report, teachers should bear in mind that:

- the pool is intended as a resource to supplement your own assessment and evaluation strategies;

- the pool should be used with a clear purpose in mind, for example:
  (1) to diagnose strengths and weaknesses of individual pupils;
  (2) to get a general picture of class achievement at end of a unit;
  (3) to help determine the appropriateness of objectives for individuals, groups, or classes;

- questions should be selected from the pool only if, in your opinion, they assess what you have been trying to teach;

- the instruments may be used in different ways and should be adapted to meet the particular needs of your pupils;

- care should be exercised in attempting to compare the performance of your pupils to the provincial performance on questions used in the field trials. Direct comparisons are possible only when identical questions are used and the same scoring procedures are followed. For example, no marks were given for answers that were partially correct. Solutions for measurement questions had to include both the number and the unit to be counted correct (e.g. 37 cm).

The three strategies presented here - for class diagnosis (A), for individual diagnosis (B), and for pretest (C) - indicate how OAIP mathematics may be used for formative evaluation. This kind of evaluation helps you make program decisions while you are still teaching a topic, for example, whether to reteach a skill to the entire class or to a smaller group of pupils; whether to change teaching strategies or learning materials.

A. Class Diagnosis*

Scenario: You have spent two days in introducing addition of integers to a Grade 7 class. After observing how pupils have responded to instruction, you decide that you need further information to see whether you should modify your teaching (e.g., reteach, give more time).

The role of the Mathematics Pool and the Field Trial Report is to supply ready-made questions, thus saving you the time and difficulty of creating your own; and to show provincial performance on six questions that were used in the field trials.

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* The same principles will apply whether the group is considered to be all the pupils in one or more classes, or one group in one class.

Procedure	Example
Examine the OAIP Mathematics Pool and the Field Trial Report to see if questions related to your objectives are available.	The teacher finds questions in the pool on pp. 99-103 and in Display 11.1 in the Field Trial Report.
If the pool has questions that assess what you have been trying to teach, select five to ten questions of different levels of difficulty.	The teacher reviews pp. 99-103 and selects two questions from p. 99, one question from p. 100, four questions from p. 101, and three questions from p. 102.
If you want to make comparisons to provincial performance, go to the appropriate display in the Field Trial Report which will provide you with six questions on the terminal objective as well as their relative difficulty.	The teacher checks Display 11.1 and replaces the three terminal objective questions from p. 102 with the six items from Display 11.1.
Give the test to all pupils providing enough time for most students to finish comfortably.	
Have the pupils do the scoring. Determine what fraction of the group answered each question correctly.	After each pupil marks his or her own paper, the teacher collects the papers and randomly redistributes them to the class. The teacher then asks by show of hands the number correct for each of thirteen questions.

Summarize the results on a question-by-question basis.

The teacher summarizes the data using the following table:

Class of 30

Pages	99		100		101			Field Trial Questions (2)	(3)	(6)	(4)	(1)	(5)
Question	1	2	3	4	5	6	7	8	9	10	11	12	13
Number Correct	30	27	25	20	22	18	20	12	12	9	7	5	2
Percentage Correct								40%	40%	25%	25%	15%	10%

Analyse the results on a question-by-question basis.

The teacher looks for discrepancies between students' performance and his/her expectations for them. After analysing results, the teacher concludes that this strategy seems to be working, even though more time might be spent on the topic. The results for question 8 indicate that the concept of opposites (42+(-42)=0) as well as the commutative property (42+45+(-42)=42+(-42)+45) should be reviewed. Questions 9 through 13 reveal increasing difficulty with other concepts tested.

B. Individual Diagnosis

Scenario: A few pupils seem to have difficulty with all aspects of the topic of adding integers. The teacher's concern is triggered by observation of class responses, by results on a pretest, and by results of a class test (as in strategy A).

The role of the Mathematics Pool and the Field Trial Report is to provide you with some questions and the mathematical models for generating other questions of roughly equal difficulty.

Procedure	Example
Determine which students are having problems in adding integers.	The teacher observes that three pupils do not respond to oral questions on this topic.
Form a working hypothesis of what may be causing the problem by analysing the responses to a test or from your observations.	The teacher in strategy A notes that three pupils answered questions 2 and 3 incorrectly as well as most of the subsequent ones. He/she hypothesizes that the pupils cannot order integers.
Develop questions to test your hypothesis by: a) creating your own questions; b) selecting questions from the pool; c) generating new questions using the models provided in the pool.	After writing two questions (that focused on comparing two integers only), the teacher goes to pp.99 and 100 in the pool. From the pool he/she copies two items and generates two more using the models provided: a) Circle the larger number: 1, -2. b) Which is smaller: 1, -1000? c) Which is the smallest number, 11, -25, or -50? (copied from p. 99 of pool) d) Which is the largest number, -1, 16, or -29? (copied from p. 100 of pool)

	e) Which is the smallest number, -40, -50, -30? (generated from the model in the pool) f) Which is the largest number, 40, -10, 10? (generated from the model in the pool)
Administer the test individually, analysing each pupil's work as he or she is doing the questions.	
Reteach any skills or concepts causing difficulty.	

C. Pretest

Scenario: You are about to start teaching applications of ratio and rate concepts to real situations (Grade 9, N6A, p. 28 in the 1980 Mathematics Guideline), and you want to determine which of the pre requisite skills the pupils have mastered and how much they already know about the new topic.

The role of the Mathematics Pool and the Field Trial Report is to provide you with some questions and the mathematical models for generating other questions of roughly equal difficulty.

Procedure	Example
Determine what you expect the class to be able to do after the topic has been taught.	The teacher checks the provincial and the board guidelines as well as the school course of study.
List critical prerequisite skills.	The teacher lists a) solving equivalent ratios and b) trans lating English statements into mathematical statements.

Study the Mathematics Pool and the Field Trial Report to see if questions are available that assess the critical prerequisite skills and the objectives of the new topic.

The teacher finds questions on pp.84-86 and on Display 7.1 for solving equivalent ratios; on pp. 133-134 for translating English statements to mathematical statements; and on pp.79-80, 148-150 and Display 10.2 for applications of ratio and rate.

Select or create five or six questions covering each prerequisite skill and the topic to be taught.

The teacher selects/creates the following questions:

a) $\frac{x}{10} = \frac{4}{1}$ $x =$ __ (Display 7.1)

b) $x:7 = 11.1$ $x =$ __ (Display 7.1)

c) $\frac{13}{x} = \frac{5}{2}$ $x =$ __ (p. 85)

d) $8:x = 4:12$ $x =$ __ (p. 86)

e) $3:4 = x:12$ $x =$ __ (p. 84)

f) $\frac{8}{5} = \frac{3}{x}$ $x =$ __ (Teacher created)

g) A player scores 32 points in 4 games. What is her average number of points per game? (p. 133)

h) Eleven people are sharing equally a bucket of chicken. If there are 33 pieces of chicken in the bucket, how many will each person get? (p. 134)

i) Some children are choosing teams. They need 3 teams with 5 players on each team. How many can play all together? (p. 134)

j) In a hockey game, Buffalo scored 3 goals and Montreal scored 2 goals. In fraction form, the ratio of Buffalo's goals to Montreal's goals is? (p. 79)

k) David's garden produced 5 dozen tomatoes and 8 dozen cucumbers. In fraction form, the ratio of tomatoes to cucumbers is? (p.80)

l) On a hike George takes 8 steps for every 10 steps that Mary takes. How many steps does Mary take when George takes 40 steps? (teacher-created)

Make sure your pupils know the purpose of a pretest so they do not fear that the results will be held against them.

The teacher explains the two purposes for the pretest (i.e., knowledge of prerequisite skills and prior grasp of the new topic).

Give the same test to all pupils.

Have the pupils do the scoring. Determine what fraction of the group answered each question correctly.

Each pupil marks his or her paper. The teacher collects the papers and randomly redistributes them to the class. Using the show-of-hands technique (as in strategy A above), the teacher records the number of students answering each question correctly.

Collect the papers and record the total score for each pupil.

Check performance on each question to decide where the main group will begin the topic.

Check each pupil's performance to determine those who have already mastered the skills or, alternatively, those who seem to be very weak in the skills.

Using OAIP Mathematics for Summative Evaluation

The following strategy indicates how OAIP mathematics may be used for summative evaluation. This kind of evaluation gives a general picture of class achievement, some indication of areas of strength and weaknesses, and/or generates information for pupils' report cards.

A. End of unit test

Scenario: You want to examine the performance of your Grade 8 class on work covered since the last term test. You have concentrated on geometry and measurement but also wish to include a few questions on previous work.

Procedure	Example
Determine whether or not there are appropriate questions in the Mathematics Pool and/or the Field Trial Report.	The teacher checks the questions in the Pool and in the Report.
If questions are available that match your objectives:	
a) take some from the Field Trial Report (if comparison purposes are sought);	a) For the test (see Appendix A), the teacher selects eight questions (1-8) from the Field Trial Report for comparison.
b) add some from each of the enabling objectives in the pool;	b) The teacher decides not to add additional questions from the pool.

c) add some of your own or from the pool in order to ensure that there is a balance reflecting priorities in the time spent and operations required (e.g., computation, application, problem-solving).

c) because the field-trial instruments selected do not include problem solving activites, the teacher adds this kind of instrument for balance.

Give the test to all pupils.

If you so wish, you can compare the class performance in the few field trial questions to the provincial results by computing a class average on each question. Remember that your performance data on each of the six questions (for each objective) used in the field trials cannot be compared exactly unless you have information on how the questions were scored in the field trials. A difference of less than ten per cent between class results and provincial statistics on a single item should not be given much importance.

The teacher summarizes the data using a data summary form (see Appendix B).

Decide how well your pupils did in light of your expectations.

Bibliography

McLean, Leslie D. Report of the 1981 Field Trials in English and Mathematics...Intermediate Division. Toronto: Ministry of Education, Ontario, 1982.

Ministry of Education. The Ontario Assessment Instrument Pool. Mathematics: Intermediate Division. Toronto: Ministry of Education, Ontario, 1980.

GRADE 8 MATHEMATICS

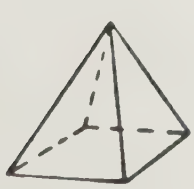
NAME.....CLASS.....DATE.....

1. Write your answer to each question on the line provided.

2. For multiple choice questions, choose the best response from the list and print the corresponding letter A, B, C, or D, on the line.

3. Use the space provided to do necessary calculations. If more space is needed, use the back of the page.

	SOURCE	#
1. $2 \times (36 - (6 + 3)) =$ _____	Field Trial Report Display 3:1	1
2. $(5 + 6^3) + 3 =$ _____	Field Trial Report Display 3:1	2
3. $6 + (30 - (2 + 7)) \times 3 =$ _____	Field Trial Report Display 3:1	4
4. Which of the following figures is a triangular prism?	Field Trial Report Display 16:1	3



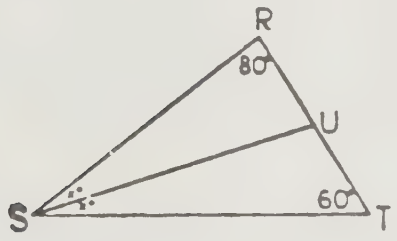
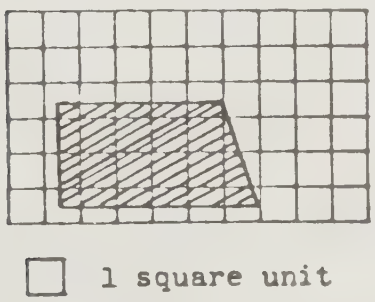
(a)

(b)

(c)

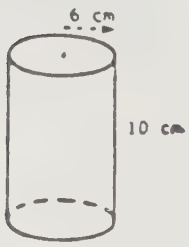
_____

		SOURCE	#
5.	104% expressed as a decimal is _____	Field Trial Report Display 8.1	1
6.	½ expressed as a percent is _____	Field Trial Report Display 8.1	3
7.	93% expressed as a fraction is _____	Created (Modified from Trial Report Display 8:1)	6
8.	Last winter the average monthly snowfall set a new record. The following figures were obtained. December - 10.22 cm January - 20.01 cm February - 24.03 cm What was the monthly average for those 3 months last winter (to 2 decimal places)? _____	Created (Modified from Field Trial Report Display 10:2	6

	SOURCE	#
9. Which of the following sequences of numbers is in the order in which they occur from left to right on the number line? (A) 0, 1/2, -1 (B) 0, -1, 1/2 (C) -1, -1/2, 0 (D) -1, 0, -1/2  _____	Created (Modified I.E.A. 2nd International Math Study Booklet 2LA)	35
10. Calculate the size of ∠SUT. It is  (A) 80° (B) 100° (C) 120° (D) 140° _____	OAIP Intermediate Math Pool Geometry (unpublished)	
11. The area of the shaded figure, to the nearest square unit, is  ☐ 1 square unit (A) 20 square units (B) 18 square units (C) 15 square units (D) 12 square units _____	I.E.A. Intermediate Math Study Booklet 3L	6

SOURCE	#
Modified from Field Trial Report Display 16:2	2

12. What is the volume of a cylinder with radius of 6 cm and height of 10 cm? (Use $\pi = 3.1$)



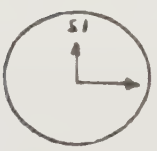
_____

OAIP Int. Math Pool Geometry (unpublished) G031502

13. These diagrams illustrate images of clock faces in a mirror. Which image shows that the time is 3:30?

(A) 

(B) 

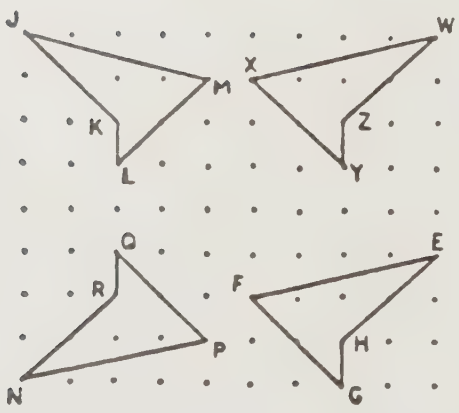
(C) 

(D) 

_____

OAIP Int. Math Pool Geometry (unpublished) G031403

14. Which statement is true?



(A) Quadrilateral WXYZ is a translation image of quadrilateral JKLM.

(B) Quadrilateral WXYZ is a translation image of quadrilateral NPQR.

(C) Quadrilateral EFGH is a translation image of quadrilateral WXYZ.

(D) Quadrilateral EFGH is a translation image of quadrilateral JKLM.

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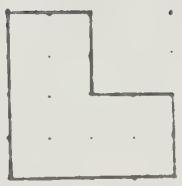
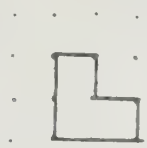
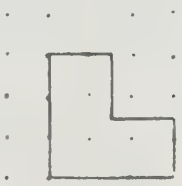
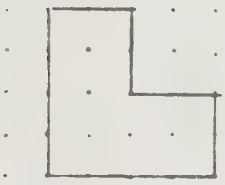
SOURCE	#
OAIP Junior Division Mathematics R021306 DM	

15. Each side of the figure on the right is reduced to 1/4 of its original length. Which one of these diagrams shows the result?



(A) 

(B) 

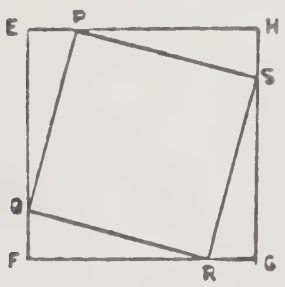
(C) 

(D) 

_____

16. EFGH is a square with side 6 cm in length, and EP = HS = GR = FQ = 1 cm.

The area of square PQRS is



(A) 15 cm^2

(B) 16 cm^2

(C) 25 cm^2

(D) 26 cm^2

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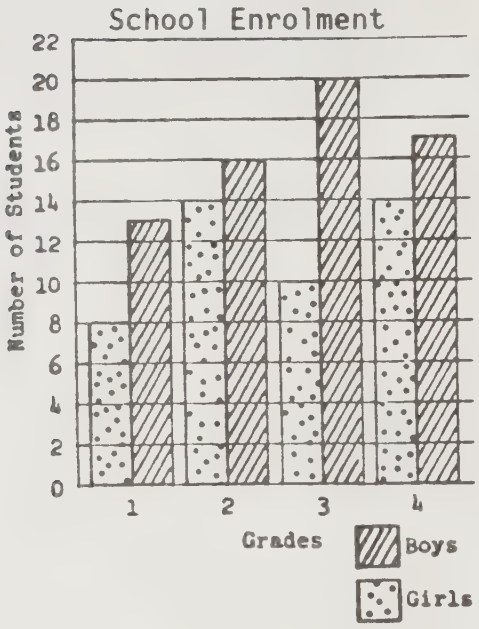
SOURCE	#
OAIP Int. Math Pool Geometry (unpublished) G013430	

SOURCE	#
I.E.A. 2nd International Math Study Booklet 2LD	21
Field Trial Report Display 10:2	1
I.E.A. 2nd International Math Study Booklet 2LB	19

17. Which of these is a TRUE statement about the information shown on the graph?



(A) Grades 2 and 4 have the same number of students

(B) Grade 3 has twice as many boys as girls

(C) Grade 4 has more girls than boys

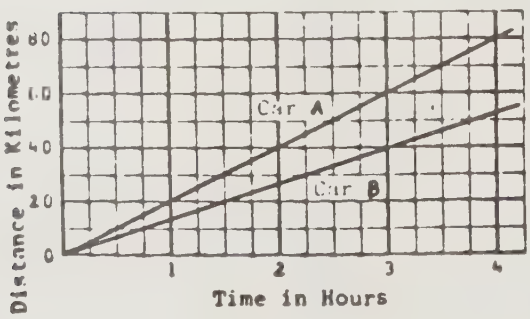
(D) Grade 1 has as many boys as there are girls in grade 4

_____

18. Doug works at a clothing store and receives a discount of 1/4 off anything he buys there. If he buys a shirt and tie, and pays $27.00 for them, how much would a regular customer have to pay for them?

_____

19. How much longer does it take for car B to go 50 km than it does for car A to go 50 km?



(A) 1 h 15 min

(B) 1 h 30 min

(C) 2 h

(D) 2 h 30 min

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SOURCE	#
OAIP Int. Math Pool Geometry (unpublished) G031522	

20. The number of tiles congruent to Fig. 1 needed to cover Fig. 2 is

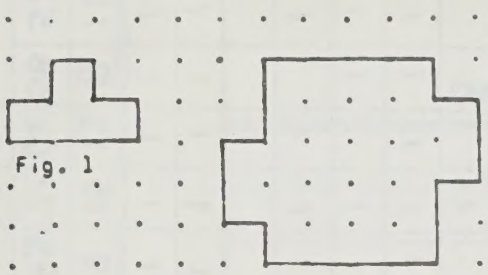


Fig. 1

Fig. 2

(A) 5

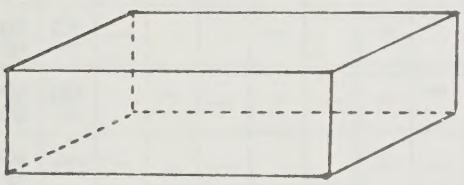
(B) 6

(C) 7

(D) 8

_____

21. This diagram represents a 3-D figure. How many planes symmetry does this figure have?



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SOURCE	#
OAIP Junior Division Mathematics CR30409DR	

CLASS RECORD SHEET

NAMES	INSTRUMENTS																					TOTALS	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Score	%
Adams, Virginia	1	1		1		1	1	1			1		1	1	1	1	1				1	13	62
Armstrong, Michael	1	1	1		1	1			1		1	1	1	1		1	1	1		1		14	67
Baldwin, Phil	1			1	1			1	1		1			1							1	8	38
Bishop, Carolyn	1	1	1	1	1			1	1	1	1		1	1	1	1		1	1	1		16	76
Bonner, John		1	1		1	1	1				1			1		1		1	1		1	11	52
Brodie, Jean	1			1	1			1	1					1		1						7	33
Caldwell, Bernice	1	1		1		1		1	1		1			1				1	1			10	48
Desjardin, Ray	1	1	1	1	1	1		1	1	1	1	1	1	1		1	1		1	1	1	17	81
Flood, Veronica			1	1		1		1			1			1			1	1	1		1	10	48
Green, Iris	1	1		1	1	1	1	1	1		1	1		1	1	1		1		1		15	71
Holloway, Alice				1		1		1			1			1		1		1	1			8	38
Horton, George	1		1	1				1			1			1				1	1			8	38
Kaye, Alvin	1	1	1	1	1	1	1	1		1	1	1		1		1	1	1	1		1	17	81
Kenny, John				1				1			1			1								4	19
Macdonald, Donna	1		1	1			1	1						1				1				7	33
MacLean, Jack	1	1	1	1	1	1	1	1	1		1	1		1		1	1	1	1	1	1	18	86
McLeod, Lloyd	1	1	1	1	1	1		1			1			1	1			1		1	1	13	62
Mitchell, Bill	1		1	1		1		1	1		1			1			1	1	1		1	13	62
Morgan, Arthur		1		1			1	1			1			1		1			1			8	38
Morgan, Jean	1	1	1	1		1	1	1			1		1	1	1		1	1	1	1	1	16	76
Scroggie, George	1	1	1	1	1	1	1		1			1	1	1		1	1	1	1	1	1	17	81
Number Correct	16	13	13	19	11	14	9	18	10	3	18	6	6	21	5	12	9	15	13	8	11		
%Correct	76	62	62	90	52	67	43	86	48	14	86	29	29	100	24	57	43	71	62	38	52		
Provincial % Correct*	69	53	75	46	39	43												10					

*(if available)